lowing formulæ, where L is the east longitude from Greenwich, l the geocentric latitude, and t the Greenwich mean time of beginning or ending, according as the upper or lower sign is employed :—

$$\text{Cos. } w = +\,109{\cdot}0051 - [2{\cdot}34285]\ \text{sin. } l + [1{\cdot}98006]\ \text{cos. } l\ \text{cos. (L} - 15^\circ\ 15'{\cdot}9).$$
$$t = 11\text{h. } 10\text{m. } 48{\cdot}9\text{s.} \mp [1{\cdot}58154]\ \text{sin. } w + [3{\cdot}16228]\ \text{sin. } l. - [3\ 95668]\ \text{cos. } l.\ \text{cos. (L} - 126^\circ\ 35'{\cdot}7).$$

TRANSITS OF MERCURY.—Prof. Holden has published an "Index-Catalogue of Books and Memoirs on the Transits of Mercury," which he had prepared to aid him in a search for records of the physical phenomena which have been observed at such transits. The list is not quite a complete one, the publications of observatories not being included, but there is little inconvenience in the omission, as such observations and memoirs can be found by reference to the volumes for transit years, and Prof. Holden gives a list of the dates of all the transits of Mercury so far observed. Catalogues of this description must prove most serviceable to the student and to every one who has occasion to consult the general literature of an astronomical subject, and we hope the American astronomer may find leisure to continue them. Reference has already been made in this column to his very valuable "Index-Catalogue to the Literature of Nebulæ and Clusters," &c., forming No. 311 of the "Smithsonian Miscellaneous Collections." The publication above mentioned forms No. 1 of "Biographical Contributions," edited by Justin Winsor, Librarian of Harvard University. The copy before us is republished from the *Bulletin* of the library for October, 1878.

BIELA'S COMET AND JUPITER IN 1794.—It will be remembered by those who may have interested themselves in cometary astronomy, that between the first appearance of Biela's comet in 1772, and the next return at which it was observed, in the latter part of 1805, the elements had undergone alterations of a magnitude that occasioned doubts as to the identity of the comets, notwithstanding the general similarity of orbits, Bessel pronouncing against it, while Gauss pointed out that more than one revolution must have been accomplished in the interval, so as to admit of the comet having approached one of the larger planets and thereby experienced perturbation to account for the differences in several of the elements. The disturbing body is now known to have been the planet Jupiter, and there has been no difficulty in fixing the epoch when the comet's motion was most deflected, but we do not recollect to have seen the particulars of the near approach of the two bodies stated in any astronomical work. Starting from the final elements for perihelion passage in 1806, determined in the masterly investigation of the late Prof. Hubbard of Washington, it appears that neglecting planetary perturbation in the interval, the comet would have made its nearest approach to the planet at the beginning of June, 1794, when their distance was less than 0·47 of the mean distance of the earth from the sun. The following distances have been similarly obtained :—

1794	Distance from Jupiter.	1794	Distance from Jupiter.
March 2	0·654	May 31	0·469
April 1	0·562	June 15	0·473
May 1	0·496	,, 30	0·488
,, 16	0·477		

At the time of closest approximation, the heliocentric longitude of the comet was about 269° 40′, and the latitude + 4° 25′.

BIOLOGICAL NOTES

GALL-MAKING INSECTS.—At the St. Louis meeting of the American Association Prof. C. V. Riley read a paper on the gall-making *Pemphiginæ*. He said that the life-history and agamic multiplication of the plant-lice (*Aphididæ*) have always excited the interest of entomologists as well as of anatomists and embryologists. The life-history, however, of the gall-making species belonging to the *Pemphiginæ* has baffled the skill of observers more than that of any other group. Mr. Riley is about to publish some new biological discoveries relating to this family of insects, in connection with a descriptive and monographic paper by Mr. J. Monell, of the St. Louis Botanic Gardens. The paper laid before the Association simply records some of the yet unpublished facts discovered. All of the older writers, in treating of the different gall-producing *Pemphiginæ* of Europe, have invariably failed to trace the life-history of the different species after the winged females leave the galls, and, with few exceptions, have erroneously inferred that the direct issue from the winged females hibernates somewhere. The most recent production on the subject is a paper published in the present year in Cassel, by Dr. H. F. Kessler, which is entitled the "Life-History of the Gall-Making Plant-Lice, affecting *Ulmus campestris*." The author, by a series of ingenious experiments, rightly came to the conclusion that the insects hibernate on the trunk, but he failed to discover in what condition they so hibernate. Led by his previous investigations into the habits of the grape Phylloxera, Mr. Riley discovered, in 1872, that some of our elm-feeding species of *Pemphiginæ* produce wingless and mouthless males and females, and that the female lays but one solitary impregnated egg. Continuing his observations, especially during the present summer, he has been able to trace the life-history of those species producing galls on our own elms, and to show that they all agree in this respect, and that the impregnated egg produced by the female is consigned to the sheltered portions of the trunk of the tree and there hibernates—the issue therefrom being the stem-mother which founds the gall-inhabiting colony the ensuing spring. Thus the analogy in the life-history of the *Pemphiginæ* and the *Phylloxerinæ* is established, and the question as to what becomes of the winged insects after they leave the galls is no longer an open one. They instinctively seek the bark of the tree and there give birth to the sexual individuals, either directly or (in one species) through intervening generations.

LEAF ABSORPTION IN PLANTS.—The earlier experimenters on this subject, M. Perault, to wit, and Hales (1731), were persuaded that leaves absorbed dew and rain. For over a century the investigations of others supported this view, until M. Duchartre, in 1857, from his experiments, advanced a contrary opinion—that now held by most vegetable physiologists, and commonly taught in our schools. But, strange to say, gardeners, in their every-day operations, adopt a different notion from that prevailing in science. The subject has recently received the attention of the Rev. G. Henslow, who, in a paper read before the Linnean Society (November 7), shows that, while it may be true that, as Duchartre has said, dew is not absorbed by saturated tissues at night; yet, on the contrary, his (Henslow's) experiments go to prove that absorption *does take place* at and after sunrise, when transpiration recommences, and an indraught is caused by the moisture, wherever lingering on the leaves. He further corroborates M. Boussingault's late assertion, that, when leaves are purposely or naturally killed by excessive drought, they then do absorb water, as proved by the balance, or otherwise.

BRITISH NEWTS.—From an article by M. Ferrand Lataste in the last volume of the *Journal* of the Société Zoologique de France, it appears that the supposed fourth species of British newt—Gray's banded newt (*Ommatotriton vittatus*) of Mr. Cooke's "Our Reptiles"—may be altogether removed from the British catalogue. It was first introduced into the British list by Jenyns, in 1835, on the faith of some specimens found in a bottle in the

British Museum by the late Dr. Gray, which, being associated with some British newts, were supposed to have been obtained in the neighbourhood of London. Through a somewhat similar error, some specimens in the collection of the Jardin des Plantes at Paris were believed by Valenciennes to have been obtained in France, near Toul, and other examples were supposed to have been found living at Antwerp. It has thus come to pass that naturalists, copying one from another, have assigned "England, France, and Belgium" as the locality of this newt. It now turns out, from M. Lataste's researches, that all these localities are erroneous, and that the so-called *Triton vittatus* is no other than the *Triton ophryticus* of Berthold, an Eastern species of newt which is found in Syria and Asia Minor. The British newts are now, therefore, reduced to three in number—the crested newt (*Triton cristatus*) and the smooth newt (*Triton tæniatus*), both of ordinary occurrence, and the rarer palmated newt (*T. palmatus*).

SPERM WHALES ON EUROPEAN COASTS.—Prof. Turner, of Edinburgh, has been collecting and investigating a number of rare prints of sperm whales stranded on European coasts at the end of the sixteenth and beginning of the seventeenth centuries. One of these illustrates a whale caught in the port of Ancona in 1601, 56 feet long, 33 feet in girth; the scene is an active and lively one, representing a landscape, fishing-boats, men engaged in cutting up the whale, spectators, &c. The Netherlands seem to have had numerous specimens stranded. These, like those occasionally visiting the Scottish coast, are all males, which, when fully grown, appear to go singly in search of food. Other whales, as cachalots, visit the south in larger numbers. Over thirty cachalots, mostly females, were stranded in 1784 in the Bay of Audierne, department of Finisterre; and a school visited Citta Nuova, in the Adriatic, in 1853.

AMERICAN JURASSIC DINOSAURS.—Prof. O. C. Marsh publishes in the current number (November) of the *American Journal of Science and Arts* the principal characters of some new species of dinosaurs. On the flanks of the Rocky Mountains a narrow belt can be traced for several hundred miles, which is always marked by the bones of gigantic dinosaurs. The strata consist mainly of estuary deposits of shale and sandstone, and the horizon is clearly upper Jurassic; the dinosaurian remains in this series of strata are mostly of enormous size, and indicate the largest land animals hitherto known. One new species (*Atlantosaurus immanis*) must have been at least eighty feet in length and several others nearly equalled it in bulk. With these monsters occur the most diminutive dinosaurs yet found, one (Nanosaurus) not being larger than a cat. Some of these new forms differ so widely from typical dinosauria that Prof. Marsh has established a new sub-order to receive them, called Sauropida, from the general character of the feet. They are the least specialised forms of the order, and in some of their characters show such an approach to the mesozoic crocodiles as to suggest a common ancestry at no very remote period. In them the front and hind limbs are nearly equal in size; the feet are plantigrade with five toes on each foot. The carpal and tarsal bones are distinct; the precaudal vertebræ contain large, apparently pneumatic cavities; the sacral vertebræ do not exceed four, and each supports its own transverse process. The pubic bones unite in front by a ventral symphisis; the limb bones are solid. One of the species described and partly figured in Prof. Marsh's paper is called *Morosaurus grandis*; when alive it was about forty feet in length; it walked on all four legs, was probably very sluggish in its movements, and had a brain proportionately smaller than any known vertebrate.

ZOOLOGICAL STATION AT TRIESTE.—It may not be generally known that the University of Vienna in addition to having a zoological establishment in Vienna, has also founded a zoological station on the borders of the Adriatic Sea at Trieste. The general director of both is Prof. Dr. Claus. The assistant at Vienna is Dr. C. Grobben, and the inspector at Trieste is Dr. Ed. Graeffe. As a first fruits of these two excellent establishments Prof. C. Claus has published Part 1 of a handsome 8vo volume entitled "Work Done at the Zoological Institute of the Vienna University and at the Zoological Station in Trieste." The work done consists of 1. A very exhaustible memoir, by Dr. Claus, on a new species of Halistemma (*H. tergestinum*), with remarks on the minute structure of the Physophoridæ. This memoir is illustrated by five folding plates. 2. Contributions to our knowledge of the male reproductive organs in the Decapod Crustacea, with remarks on their comparative anatomy as compared with the same organs in the rest of the Thoracostraca, by Dr. C. Grobben, with six folding plates. 3. On the origin of the nervous vagus in the Selachians, with special regard to the electrical lobes in Torpedo; this is illustrated with woodcuts and one plate. The University of Vienna and Prof. Claus are indeed to be heartily congratulated at these first results from their new institution.

GEOGRAPHICAL NOTES

AT the meeting of the Royal Geographical Society on Monday last, a paper on "Usambara, East Africa, and the Adjoining Country," was read by the Rev. J. P. Farler, who has spent the last three years there in connection with the Universities' Mission. Usambara is described as the Switzerland of Africa, and forms a link in the great East Coast range, which extends from Abyssinia to Natal; roughly speaking, it lies between S. lat. 4° 20′ and 5° 25′, and E. long. 38° 20′ and 39° 10′. The mountains form four detached lines running due north and south, and rising in the higher peaks to about 6,000 feet above the sea-level. The range was evidently thrown up by volcanic action, and consists of granite mixed with spar, with sandstone in the lower spurs containing plumbago. Mr. Farler describes the scenery as varied and beautiful, now soft valleys and hill-sides with hanging woods, now again wild ravines with precipitous cliffs of bare granite. Usambara is drained by four rivers: the Zigi, with its affluent, the Kihuwi, the Mkulumuzi, the Ukumbini, and the Luari, the two first-named emptying into Tanga Bay; none of the four, however, are navigable. Trees are found in the region in great variety, but mostly of stunted growth; euphorbias, fan-palms, and mimosa thorns are seen everywhere, and occasionally baobabs, tamarind-trees, and clusters of the Borassus palm; there is also a kind of wild palm-tree. Various animals are found in the Mjika, or wilderness—antelopes varying from the size of a cow to that of a small goat, gazelles, lions, leopards, hyænas, and large apes. Mr. Farler mentions a noteworthy peculiarity in regard to the River Mkulumuzi, which in the rainy season becomes a torrent: "The stream has cut a deep bed for itself in the granite sides of the mountain, and exploring this bed in the dry season, I have found perfectly round, well-like basins in the rock, varying from a foot in diameter and depth to 10 feet in diameter, and from 8 to 12 feet in depth. There is always a stone at the bottom of these basins, and they must have been formed by the torrent giving, during the rainy season, a rotary motion to the stone." The soil throughout Usambara is a red disintegrated clay upon a granite and sandstone foundation, and covered with a rich vegetable loam; the bottoms of the valleys contain beds of alluvial clay. Probably no more fertile soil could be found in the world, and it is capable of producing every tropical plant. The flora of the region is extensive; in the forests are found ebony, copal, teak, acacia, the india-rubber tree,